REMARKS

Claims 1 to 3, 5, 6, 9, 11 and 12 were rejected under 35 U.S. §103(a) as being unpatentable over Fujii (US 5,663,628) in view of Yoshikawa et al. (US 6,317,697). Claims 4 and 10 were rejected under 35 U.S. §103(a) as being unpatentable over Fujii in view of Seri et al. (US 5,994,877). Claims 7, 8 and 13 to 20 were rejected under 35 U.S.C. §103(a) as being unpatentable over Fujii and Yoshikawa et al. in view of Kinoshita (US 5,703,469).

Claims 1, 9 to 11 and 18 to 20 have been amended. Claims 2 and 3 have been canceled.

Reconsideration of the application based on the following is respectfully requested.

Summary of Examiner Interview

Applicants' representative, Clint Mehall, conducted a telephone interview with the Examiner on January 16, 2009. The Examiner advised that the current rejections would be overcome if the limitations of claims 2 and 3 were added to claim 1.

Rejections under 35 U.S.C. §103(a)

Claims 1 to 3, 5, 6, 9, 11 and 12 were rejected under 35 U.S. §103(a) as being unpatentable over Fujii (US 5,663,628) in view of Yoshikawa et al. (US 6,317,697). Claim 1 has been amended to include the limitations of claims 2 and 3.

Fujii discloses a battery system with leveled discharge. A battery 1 provides energy to a load L by supplying current through a limiting resistor 2 to an electric double load layer capacitor 3, which discharges a current greater than that supplied by battery 1 to the load. (Col. 2, lines 47 to 48; col. 7, lines 49 to 64). A discharge controller 4 causes capacitor 3 to discharge the energy at a greater current to the load intermittently for a time period that is shorter than the period that battery 1 charges capacitor 3. (Col. 2, lines 62 to 67; col. 7, lines 49 to 64). Allowing battery 1 to emit a smaller current reduces the depth of discharge of battery 1 and increases the number of cycles of battery 1, extending the life of battery 1. (Col. 11, lines 54 to 64; col. 7, lines 49 to 64).

Yoshikawa et al. discloses a battery life determination apparatus and method. A life of a battery 13 is determined by a life determination circuit 50 of a BMCU microcomputer 26. (Col. 8, lines 18 to 20). "This life determination is carried out, in principle, through the steps of determining the discharge voltage drop amount characteristic (actual discharge voltage drop amount characteristic) of the battery 13 by discharging the electricity charged in the battery 13 three times (initial discharge), and comparing the result with standard discharge voltage drop amount characteristics stored in the BMCU microcomputer 26. Further, the determined life value is re-determined by taking into consideration the charge history, elapsed time required for charging, etc. of the battery 13, and a notice of battery replacement or the like is issued based on the determination result." (Col. 8, lines 20 to 31). A temperature measuring section 54 detects temperature based on an output from temperature sensor 14 and a load capacity measuring section 55 detects the load of the electrical appliance 40. (Col. 9, lines 1 to 16). A totalizer section 56 measures discharge voltage drop of battery 13 over three set time periods and totalizes the measured amounts of discharge voltage drops for the three time periods. The measured amount of discharge voltage drop I is divided by a standard discharge voltage total value in a standard total value table to determine a correction factor γ. (Col. 9, lines 37 to 60).

Claim 1, as amended, recites "[a] method for determining a deterioration of a battery, comprising:

measuring respective numbers of charge and discharge cycles at a plurality of depths of discharge of the battery;

determining a respective characteristic deterioration value for at least some of the charge and discharge cycles at each of the plurality of depths of discharge using a deterioration curve characteristic of a type of the battery; and

summing the determined characteristic deterioration values so as to obtain the deterioration of the battery;

wherein each respective charge and discharge cycle is a respective partial cycle, the measuring being performed so as to measure the respective partial cycle separately;

wherein the deterioration curve is a continuous function defining a dependence of each characteristic deterioration value on the depth of the respective charge or discharge for the battery type."

It is respectfully submitted that neither Fujii nor Yoshikawa et al. discloses "wherein each respective charge and discharge cycle is a respective partial cycle" or "the measuring being performed so as to measure the respective partial cycle separately" as now recited in claim 1 and it would not have been obvious to one of skill in the art to have modified Fujii in view of Yoshikawa et al. to meet these limitations. In particular, contrary to the Examiner's assertions in the Final Office Action, it is respectfully submitted that Fig. 6 of Yoshikawa et al. shows a discharge voltage drop amount and does not show a respective charge and discharge cycle at all. Moreover, at col. 18, lines 56 to 64, Yoshikawa et al. discusses an initial discharge of a battery, not respective charge and discharge cycles.

Furthermore, it is respectfully submitted that neither Fujii nor Yoshikawa et al. discloses "the deterioration curve is a continuous function defining a dependence of each characteristic deterioration value on the depth of the respective charge or discharge for the battery type," as now recited in claim 1 and it would not have been obvious to one of skill in the art to have modified Fujii in view of Yoshikawa et al. to meet this limitation. It is respectfully submitted that the curve in Fig. 6 of Fujii defines the number of cycles a battery can perform depending on the depth of discharge that is constantly used throughout the cycles and in no way discloses a deterioration curve that "is a continuous function defining a dependence of each characteristic deterioration value on the depth of the respective charge or discharge for the battery type" as now required by claim 1. (See Fig. 6; Col. 11, Lines 54 to 59).

Withdrawal of the rejection under 35 U.S.C. §103(a) to claim 1, and claims 5, 6, 9, 11 and 12 depending therefrom, is respectfully requested.

Claims 4 and 10 were rejected under 35 U.S. §103(a) as being unpatentable over Fujii in view of Yoshikawa et al. and further in view of Seri et al. (US 5,994,877).

Fujii and Yoshikawa et al. are described above.

Seri et al. discloses methods for detecting a working condition of a non-aqueous electrolyte secondary battery which allow easy and accurate determination of the degree of

degradation and remaining capacity of the non-aqueous electrolyte secondary battery by a simple test irrespective of the past charging and discharging history of the battery. (Abstract).

Claim 4 recites the method as recited in claim 1 wherein the deterioration curve includes approximated intervals having a class width adapted to the respective battery type, the deterioration curve defining a dependence of a respective characteristic deterioration value on the depth of the respective charge or discharge.

Claim 10 recites the method as recited in claim 2 wherein the deterioration curve includes approximated intervals having a class width adapted to the respective battery type, the deterioration curve defining a dependence of a respective characteristic deterioration value on the depth of the respective charge or discharge.

In view of the above arguments with respect to why claim 1 is not unpatentable in view of Fujii and Yoskikawa et al., withdrawal of the rejection under 35 U.S.C. §103(a) to claims 4 and 10, which depend from claim 1, is respectfully requested.

Furthermore, it would not have been obvious for one of skill in the art to have combined Fujii and Yoshikawa et al. with Seri et al. to meet the limitations of claims 4 and 10 because Seri et al. teaches away from claims 4 and 10. It is respectfully submitted that at Col. 6, Lines 46 to 52, cited at page 4 of the Office Action, Seri et al. teaches away from "measuring respective numbers of charge and discharge cycles at a plurality of depths of discharge of the battery," as recited in claim 1, which claims 4 and 10 depend, because Seri et al. discloses determining the number of charge and discharge cycles for only one depth of discharge (3.0 V). (See, e.g., Fig. 1; Col. 6, Lines 16 to 52).

Also, it is respectfully submitted that, contrary to the assertion of the Office Action on page 4, Seri et al., at Col. 6, Lines 46 to 52, does not disclose "the deterioration curve includes approximated intervals having a class width adapted to the respective battery type," as embodiment 1 of Seri et al. only relates to one model of lithium ion batteries. (See Col. 6, Lines 16 to 20).

Claims 7, 8 and 13 to 20 were rejected under 35 U.S.C. §103(a) as being unpatentable over Fujii and Yoshikawa et al. in view of Kinoshita (US 5,703,469).

In view of the above arguments with respect to why claim 1 is not unpatentable in view of Fujii and Yoskikawa et al., withdrawal of the rejection under 35 U.S.C. §103(a) to claims 7, 8 and 13 to 20, which depend from claim 1, is respectfully requested.

CONCLUSION

The present application is respectfully submitted as being in condition for allowance and applicants respectfully request such action.

Respectfully submitted,

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